APPENDIX I

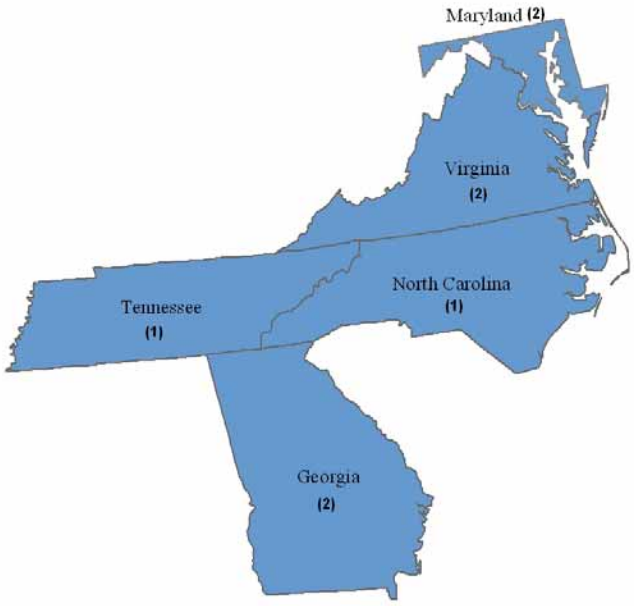
STORMWATER MANAGEMENT BENCHMARKING REPORT

INTRODUCTION

The purpose of this stormwater management program benchmarking report is to gain a better understanding of the current state of the Fairfax County Stormwater Management Program and how Fairfax's program may compare to other major urbanized communities from around the mid-Atlantic region and the eastern United States. The desired end result of this exercise is the compilation of information on what a variety of municipal stormwater programs accomplish and how they measure or track their success. Examination of these benchmarks provides Fairfax County with a tool to measure its own programs' successes and challenges and to highlight potential programming decision points that may lead to policy and programming adjustments.

FAIRFAX COUNTY

Fairfax County is a large and diverse community located on the south shore of the Potomac River in the northern Virginia region just south and west of Washington, D.C. Fairfax has a growing population that totaled roughly 969,749 in the 2000 Census and covers approximately 399 square miles of land. The County's population projection through 2003 shows growth to 1,012,100[1], a 4.4 percent increase over the three-year period. The County's terrain can best be described as "piedmont," with a mix of rolling hills away from the Potomac shoreline and some coastal characteristics closer to the lower Potomac River, which is brackish and tidal along its Fairfax County shoreline south of the City of Alexandria. The County is comprised of 30 watershed sub-basins, which all eventually drain to the Potomac River. County staff estimates that the County is now approximately 90 percent "built out," with only certain portions of the County remaining available for development and still other portions' sensitive watersheds protected by regulation.



Benchmarking Study Process

For purposes of this benchmarking exercise, the study examined a group of localities from the eastern United States, with a concentration on the mid-Atlantic and southeastern United States, that, in the estimation of the County staff, are reasonably representative of the conditions found in Fairfax County and will provide a defensible measuring stick

[1] Weldon Cooper Center for Public Service, 2003 Provisional Population Estimates for Virginia. February 2, 2004.

against which to benchmark the County's stormwater services. The list of communities is found in Appendix I-1. The geographic breakdown of the study area is shown above.

The survey was completed through the use of a benchmarking questionnaire that sought to measure a number of different stormwater management practices, characteristics, policies, procedures, and funding strategies. The benchmarking questionnaire used for this study is found in Appendix I-2. Information pertaining to the survey questions was collected from each community, with follow-up telephone calls made to many communities so as to clarify answers received.

Several key points about the survey process and the subsequent results shown in this report warrant comment. While the survey questionnaire sought only community specific data, several of the categories of questions and their answers are necessarily affected by conditions or political structure outside the control of a given jurisdiction. For instance, in states utilizing a home rule form of government, where the municipality has some individual latitude regarding programming and policy development, results in subsequent programming may differ from those states that utilize a "Dillon Rule" structure, whereby localities can only act up to a certain threshold without approval from the state legislature. Virginia is a Dillon Rule state. Secondly, the local City/County construction and relationship varies from state to state. In Virginia, cities are completely independent entities from the counties in which they may reside. Towns are incorporated, but do not have the independent authority of cities. In other states, such as North Carolina, cities and towns are almost always part of the overall county structure, with counties exercising a certain amount of oversight and jurisdiction over city and town activities. These organizational issues impact the way in which local governments administer their municipal stormwater management program.

In addition to the overarching impacts of state and local governmental structure and function, other assumptions and assertions have been made in this survey to address like issues and options. As witnessed through the questionnaire in Appendix I-2, the survey sought fairly detailed information from the selected communities relating to specific operations, maintenance, regulatory compliance, and capital improvement programming. Each community's response differed based on the exact types of activities and priorities addressed in that particular jurisdiction. As such, the consulting team gathered the responses and categorized those responses as consistently as possible to capture the broader conclusions offered from the data.

In order to organize the results in a way that facilitates report presentation, the questions included in this survey have been cataloged into four broad categories:

- **Basic Data**: including demographic, topographic, hydrologic, and land use characteristics;
- **Program Data**: including a number of topics related to services provided by the communities examined, including regulatory programming, operational services and policies, and capital improvement programming;
- **Physical System Data**: including an inventory of the system that the participating communities manage, as well as some of the physical characteristics of that system;
- **Budget and Funding Data**: including community budget allocations for stormwater services as well as community funding approaches for those services.

A summary of the results of the surveyed data from each of these categories follows.

BASIC DATA

The jurisdictions surveyed for the benchmarking study all share certain characteristics and features, as well as certain unique conditions. The following tables, charts and discussion demonstrate the basic characteristics of the surveyed communities as well as those same characteristics for Fairfax County.

Basic Data tables and charts include:

- Population and population served by community stormwater management program
- Area of jurisdiction in square miles
- Annual precipitation
- Physiographic regions (riverine, tidal, etc…)
- Land cover characteristics

PROGRAM DATA

Each of the jurisdictions surveyed provide some level of stormwater management services to their citizenry. The survey questionnaire detailed a number of programmatic activities that define a typical municipal stormwater management program. Broader definitions of program areas assessed include Customer Service, Erosion and Sediment Control, Floodplain Management, Dam Safety, Roadway Drainage, Inspection Services, Capital Improvement Program, Environmental Mandates, Watershed Management, Geographic Information Systems (GIS), and GASB 34 Asset Valuation. Table 4 presented below demonstrates the range of programmatic activity, by category, for each of the studied jurisdictions.

PHYSICAL SYSTEM DATA

Each of the jurisdictions polled for this survey manage a unique physical stormwater management system. Some deal with more closed pipe systems, others with more open channels and ditch systems, usually depending on topography and historical land development patterns. In addition, each jurisdiction utilizes a variety of stormwater best management practices (BMPs) to manage stormwater impacts, both quality and quantity. Among the common themes that evolved through research on physical system inventories, one of the most common was the difference in the way communities tracked or attributed system data. For instance, some communities track stream miles only in terms of the stream mileage listed on their respective FEMA Flood Insurance Studies and Flood Insurance Rate Maps. Other communities classify stream miles by the number of miles of perennial stream found in the community, often utilizing a different regulatory definition. Finally, and perhaps most importantly, the task of tracking and updating a given community's stream and stormwater system is daunting. Many of the communities polled, even those with fairly progressive stormwater management programs, do not necessarily have an accurate accounting of their physical infrastructure.

The task of gathering and managing that information continues to prove difficult. Some communities polled could provide accurate data on their physical system, others could not. However, the survey did demonstrate that among the jurisdictions polled, almost all noted the existence of both closed (i.e. piped) and open (i.e. ditched) stormwater

conveyance systems. In addition, of the communities that responded with specific data about BMPs in use, a wide variety of practices were listed. BMPs typically employed in the studied communities included the following:

- Oil/Grit Separators
- Infiltration facilities
- Wet ponds
- Underground storage facilities
- Filtration Devices
- Dry ponds
- Extended detention facilities
- Low Impact Development practices (i.e. rain gardens)

FUNDING AND BUDGET DATA

The level of service provided for physical infrastructure maintenance, stormwater management planning, regulatory compliance, and capital construction and improvement programs in each of the surveyed jurisdictions can be traced directly to the amount each community budgets for stormwater-related service and the availability of funding to provide those budgeted dollars. Table 6 details the budget information and per capita spending of each community surveyed.

The surveyed communities receive funding from various sources such as the general tax fund, stormwater taxes, user fees, permit fees, pro rata shares and other fees. Table 7 summarizes the funding mechanism data.

APPENDIX I-1

The communities in the Benchmarking Study are:

- Prince Georges County, MD
- Montgomery County, MD
- Cobb County, GA
- Fulton County, GA
- Charlotte-Mecklenburg County, NC
- Nashville-Davidson County, TN
- Chesterfield County, VA
- City of Virginia Beach, VA

APPENDIX I-2

SURVEY QUESTIONNAIRE

Basic Data:

1. Population of jurisdiction – total:
2. Population of area served (total plus/less any incorporated areas or other jurisdictions served/not served by County if appropriate):
3. Area of jurisdiction: total area
4. Area served by stormwater program (square miles)
   (identify area of other jurisdictions served, if appropriate)
   (identify unincorporated area served, if appropriate)
5. Precipitation (annual average)
6. Topography (i.e., riverine, tidal, coastal, piedmont, mountainous)
7. Land use by category: (in percent of total area)
   Commercial retail
   Office park
   Warehouse
   Industrial
   Open space
   Park land (if tracked separately)
   Conservation land
   Residential – single family
   Residential – multifamily

Program Data:

1. Identify services provided

Program Area	Yes No	Quantity/Frequency	Public System	Private System
SW Plan Review				
SW Facilities Inspections				
Floodplain management				
NPDES Permit (date of issuance – can we have a copy?)				
TMDLs (give purpose)				
Watershed management strategy – mandated				
Water quality monitoring: biological/ chemical/ physical				
Public education program				
Public involvement program				

Customer service				
Inventory of physical system (if yes, GIS?)				
Roadway drainage maintenance responsibility (if no, who)				
GASB 34 valuation				
E&S Program				
Inspection: construction				
Inspection: maintenance				
Inspection: regulatory				
CIP Management				
CIP Design				
CIP construction oversight				
Dam Safety				

2. Budget for stormwater services identified in #1:

Program/Service	#FTE	Current Annual Budget	Notes

3. Physical system inventory

System Element	Public Managed/Maintained	Privately Managed/Maintained
Pipe		
Ponds		
Catch basins/inlets		
WQ Structures – mechanical		

(inserts/sand filters, etc)		
WQ Structures - constructed (permanent wet facilities, ponds etc.)		
WQ Structures - constructed (dry ponds, LID facilities, rain gardens, green roofs)		
Stream miles		
Open systems (ditch, man-made channels)		

4. Best Management Practices Authorized/Allowed (Identify type)
5. Do you have policies/design standards/design manual for authorized BMPs? Are they available on web? Can we get a copy?

6. Maintenance policies:
    a. Internal policies or standards for maintaining system? Can we get a copy? Do your policies address small scale BMP maintenance (LID measures, i.e. rain gardens) on individual lots?
    b. Are there standard of performance for Privately owned drainage system features? Do you have agreements in place? Are standards enforced? What enforcement procedures do you utilize?

7. Do you have an infrastructure replacement schedule or policy? How did you establish it?

8. General age of drainage system?

9. Do you have a CIP program? If yes:
    a. how many years are projected in the plan?
    b. what is the dollar value projected for year year?
    c. do you have a prioritization plan or policy with rating factors? Can we obtain a copy?

10. Funding:

Primary: General Fund, Utility for stormwater (user fee), bonds for capital improvements
Secondary: Impact fees, developer fees, plan review fees, system development charges, inspection fees

If you have a utility, what is the rate structure? When was the utility created? What is the annual revenue generated? What other revenues are included in utility structure (grants/fees/General Fund)? How are residential and non-residential units handled in your utility rate structure?

If you have a utility, how do you deliver the bill to the customer? Frequency of bill cycle?

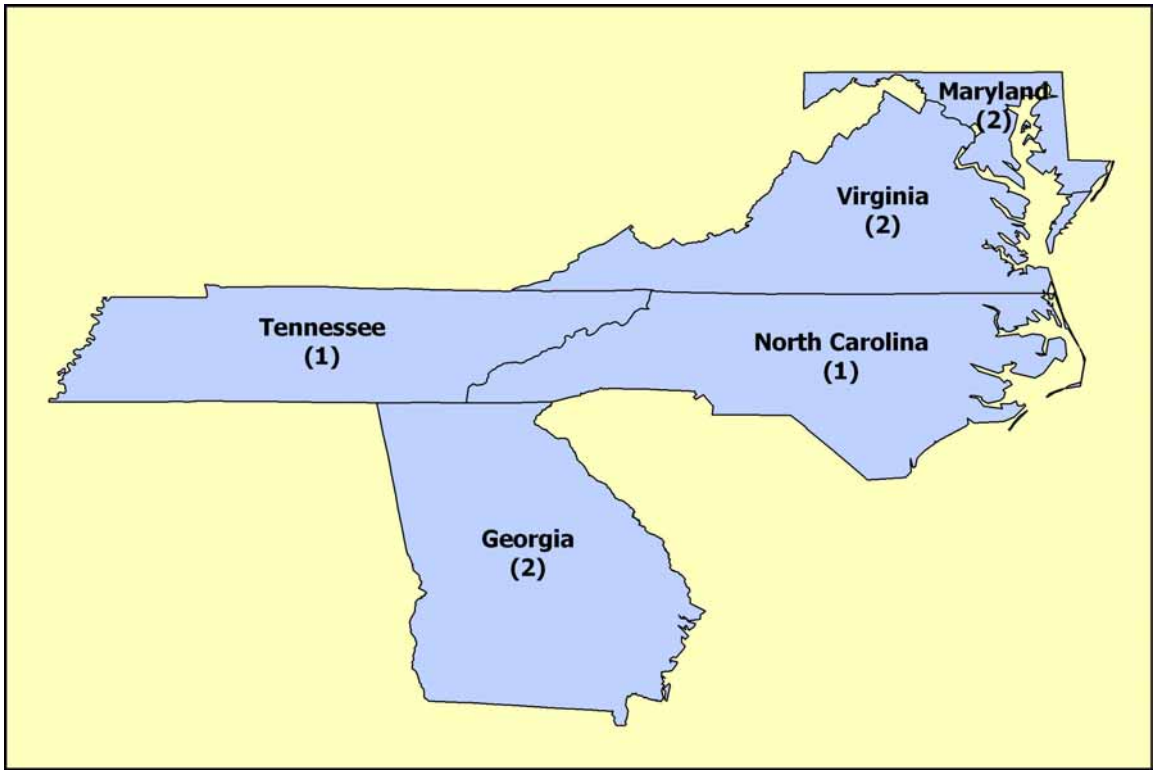
What key political, legal, and technical issues resulted before/during/after utility implementation, if any?

APPENDIX I-3

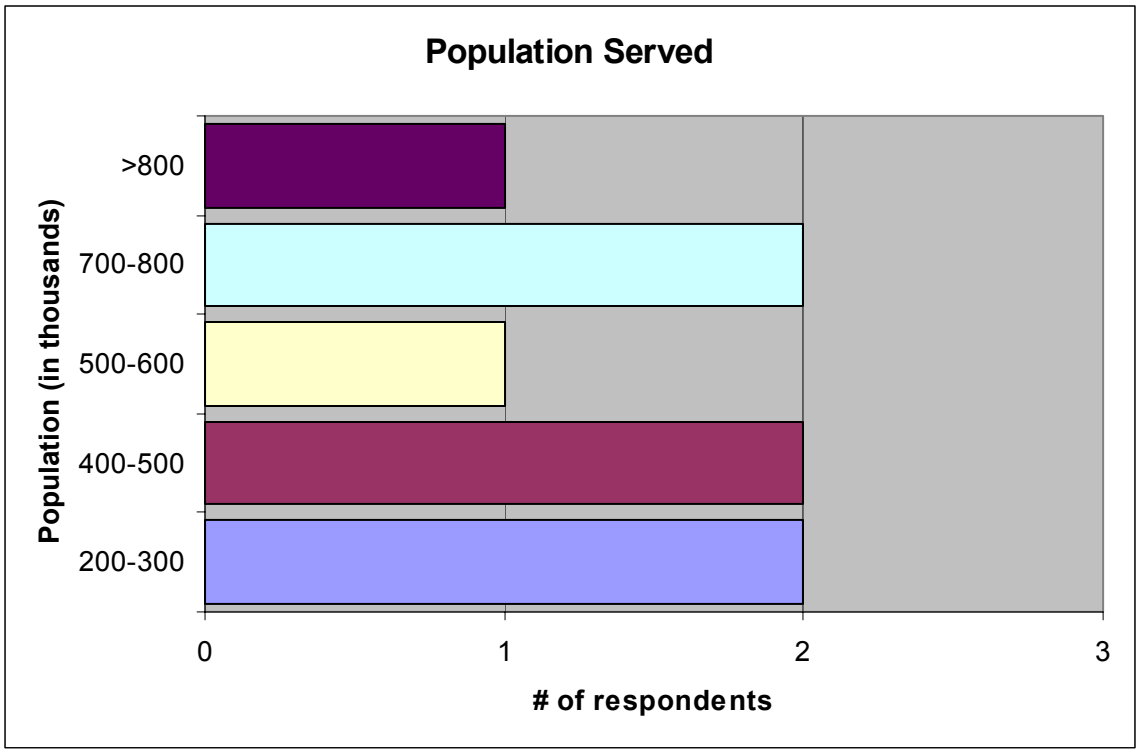
TABLES AND GRAPHIC REPRESENTATION OF DATA

DEMOGRAPHIC INFORMATION

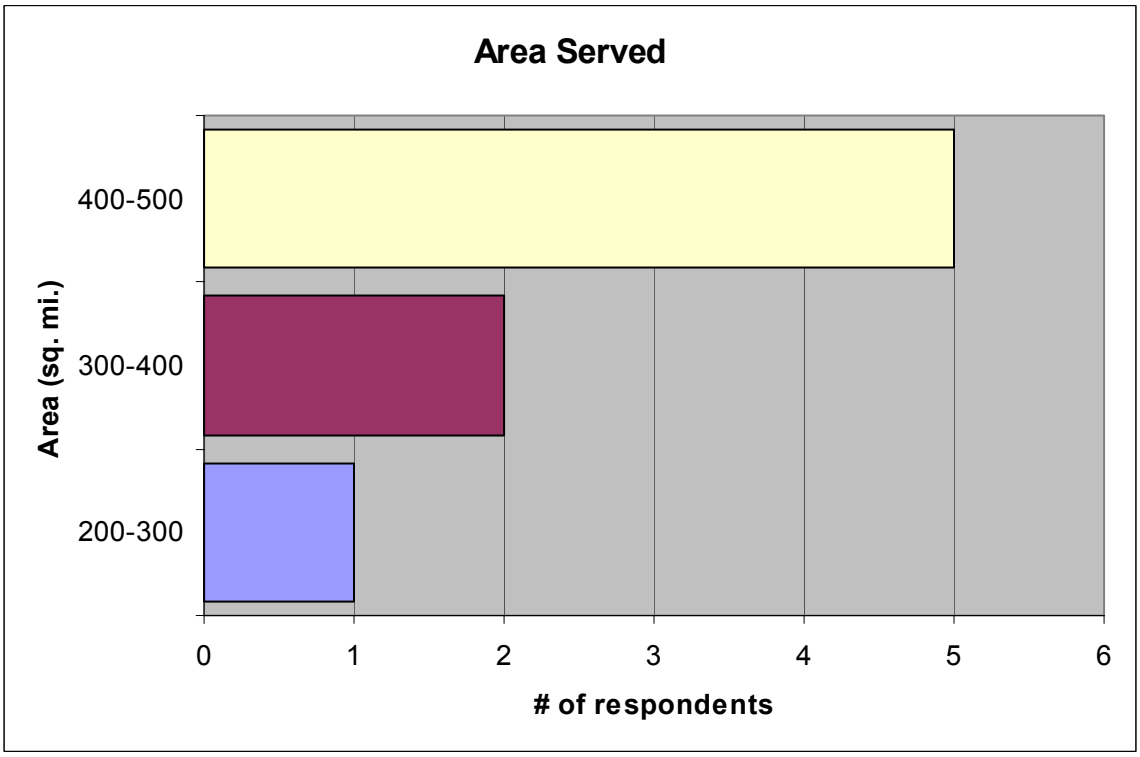
There were a total of eight respondents to the Stormwater Management Benchmarking Survey. The respondents were all from the Southeastern United States. The number of responding municipalities from each of the states is depicted in the map below. The responses in this survey do not include Fairfax County data.



The size of the municipalities included in the survey varied in size. The following graph depicts the different ranges of the population served by the different Stormwater Organizations. The range of populations was from a minimum of 231,370 to a maximum of 826,000. The population served for Fairfax County is 997,600.

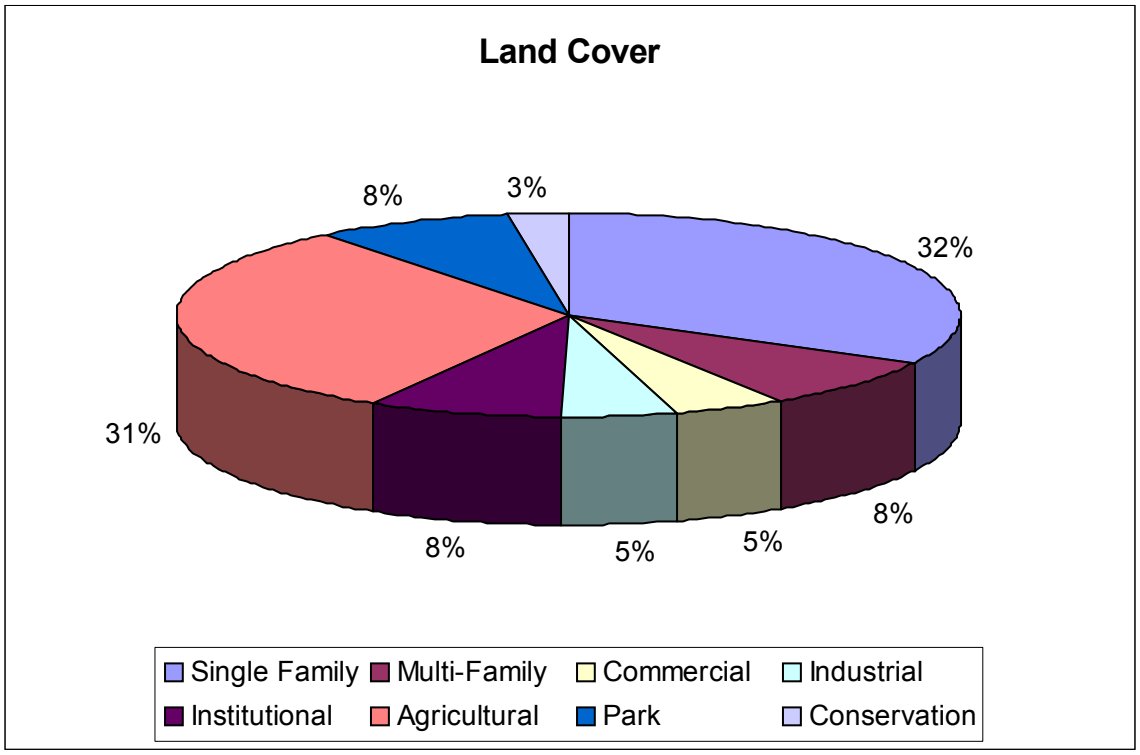


Below is a graph depicting the different sizes of the area served by the different Stormwater communities. The range of areas served varied from a minimum of 281 square miles to a maximum of 497 square miles. The service area for Fairfax County is 378 square miles.



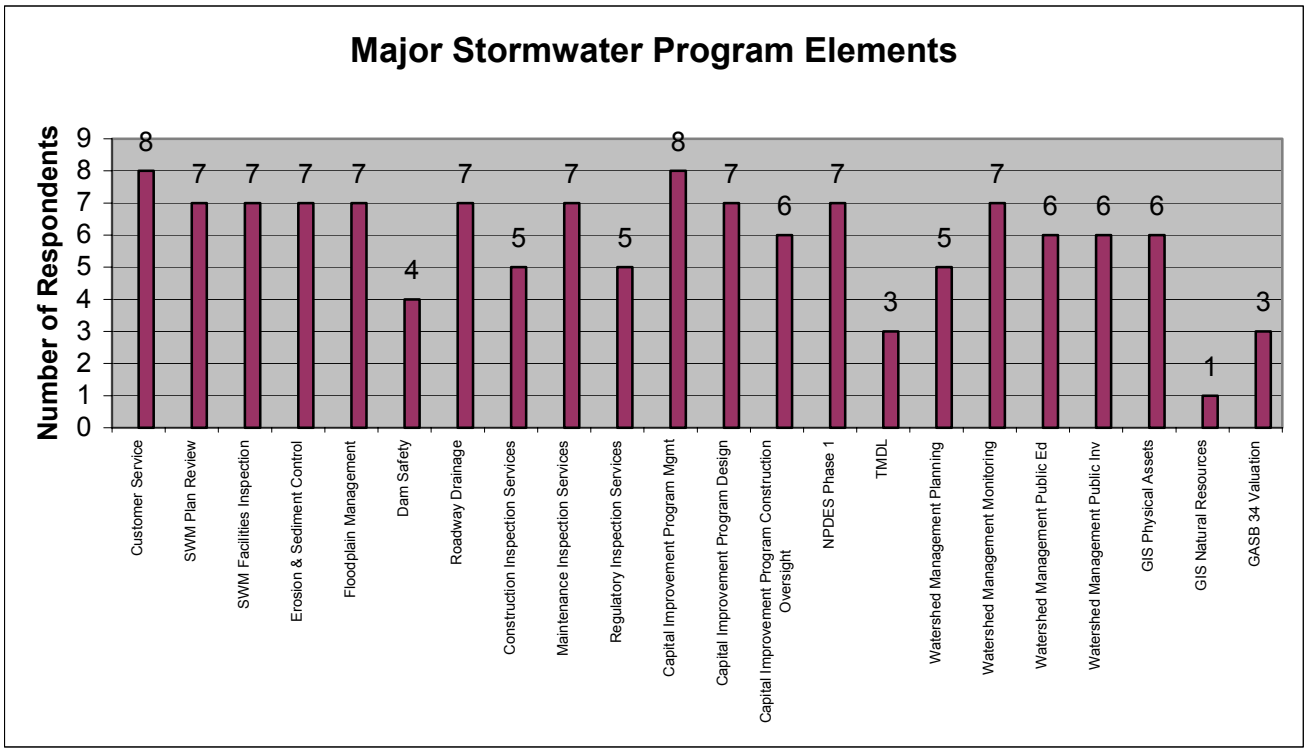
Land Use

Below is a graph depicting the different average land covers for the respondents. The greatest land cover, on average, was for single-family development and the smallest land cover, on average, was for conservation.



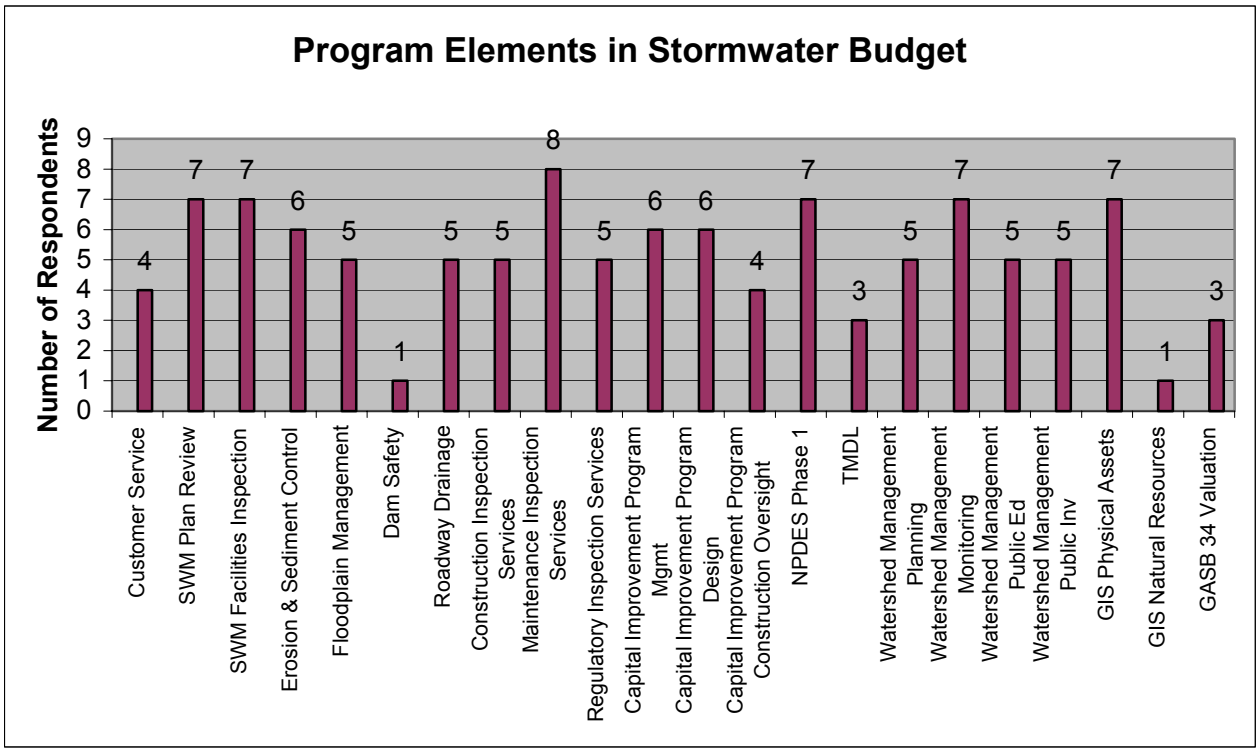
Major Stormwater Program Elements

The graph below depicts the number of respondents that include each Major Stormwater Program Element in their list of provided services. All eight respondents provide a Customer Service Function and Capital Improvement Program Management. However, only one respondent captures Natural Resources in their GIS. Fairfax County includes all 22 Stormwater Program Elements except Roadway Drainage and Natural Resources in their GIS.



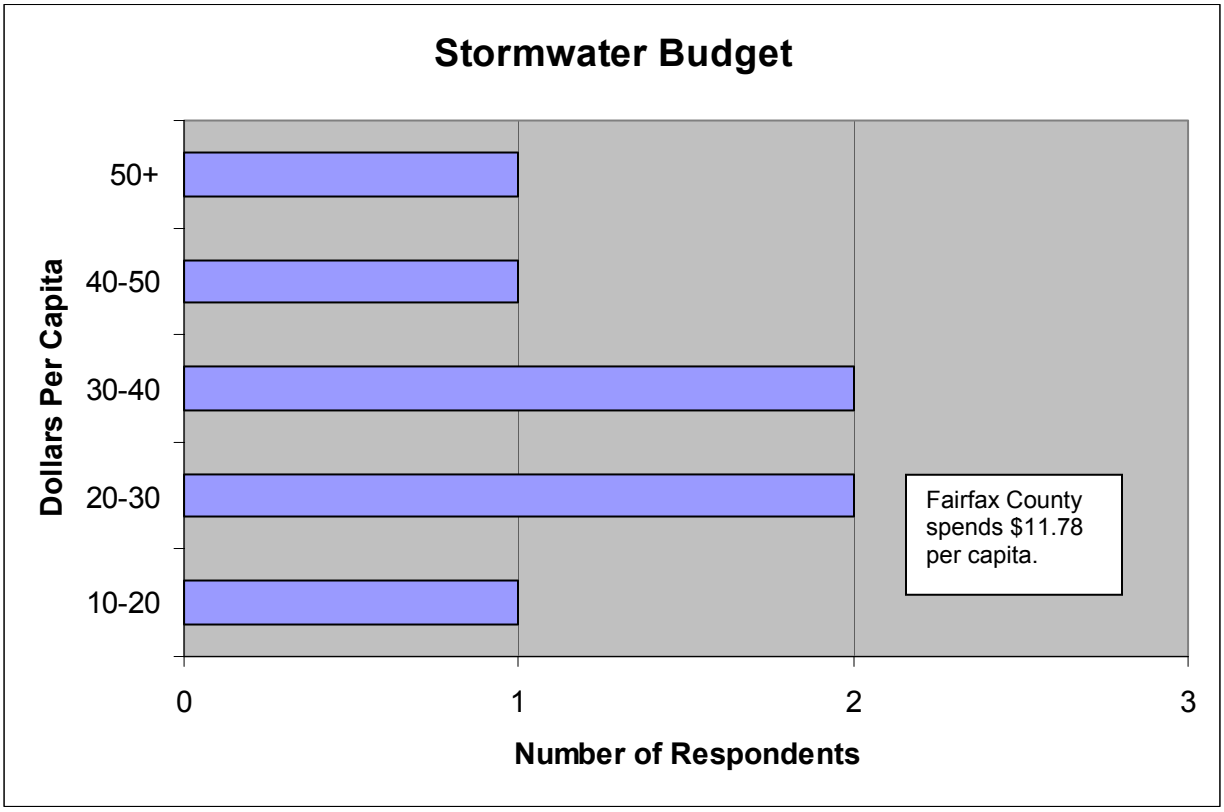
Program Elements in Stormwater Budget

The graph below depicts the number of respondents that include each Major Stormwater Program Element in the Stormwater Budget. All eight respondents include the cost of Maintenance Inspection Services in the Stormwater Budget. However, only one respondent includes the cost of their Dam Safety Program and includes Natural Resources in their GIS. Of the 20 Stormwater Program Elements provided by Fairfax all are included in the Stormwater Budget except Customer Service.



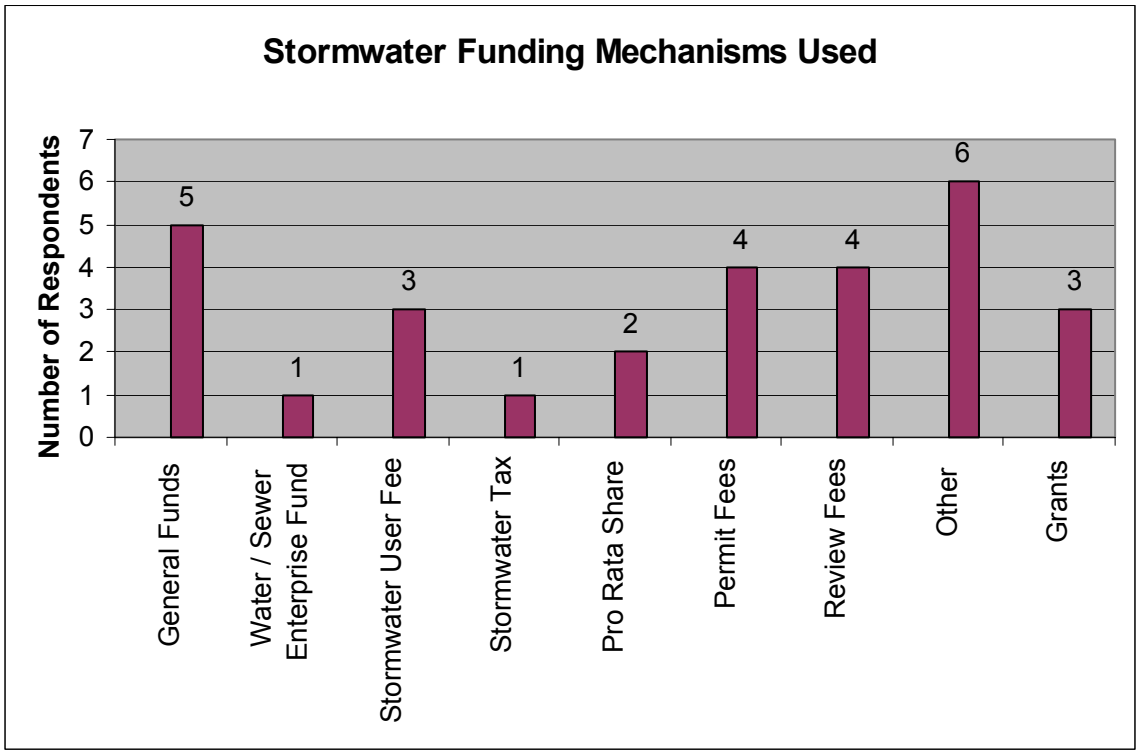
Stormwater Program Per Capita Expenditure

Below is a graph depicting the per capita expense of the Stormwater Program for the respondents. The range of expenses was from a minimum of $13.88 per capita to a maximum of $50 per capita. The expenses for Fairfax County are $11.78 per capita. One community reported a per capita expense of only $3.97; however this expense only included maintenance activities and watershed planning and this information is not included in the graph below



Stormwater Funding Mechanism

Below is a graph depicting the funding mechanisms used by the respondents for stormwater programs. Only two respondents relied solely on one funding mechanism. One relies on a Stormwater User Fee and one relies only on General Funds. It should be noted of the eight respondents three have a Stormwater User Fee in place and two are considering a Stormwater User Fee.



APPENDIX I-4

The following pages summarize the information provided by each of the eight respondents.

Virginia Beach, Virginia (Community ID #1)

Virginia Beach is located in Riverine, Tidal and Coastal Physiographical Regions in southeast Virginia, contiguous to the Chesapeake Bay. It has a population of 435,000 that resides in an area over 406 square miles.

Major Stormwater Program Elements (Table 4):

- Customer Service
- Stormwater Management: Facilities Inspection
- Erosion and Sediment Control
- Floodplain Management
- Dam Safety
- Roadway Drainage
- Inspection Services: Maintenance and Regulatory
- Capital Improvement Program: Management, Design,
- NPDES Phase I
- TMDL
- Watershed Management: Planning, Water Quality Monitoring, Public Education, Public Involvement
- GIS: Physical Assets

Virginia Beach does not provide Stormwater Management Plan Review, Inspection Services for Construction, CIP Construction Oversight, or GASB 34 Valuation, all of which are provided by Fairfax County.

Virginia Beach has a stormwater budget of $17,465,800.

- Public System Components:
- Roadside Ditches
- Off Road Ditches

The Virginia Beach CIP program includes road drainage, master planning, water quality, and dam safety projects.

Virginia Beach utilizes a Stormwater Utility Fee and Other Fees to fund stormwater programs. They implemented their Stormwater Utility Fee in July 1993. It is currently a separate bill, but will be merged with the water/sewer bill in August 2004. The Utility Fee is based upon the Equivalent Residential Unit (ERU = 2,269 square feet). Each SFR is charged one ERU. NSFR and Non-residential are charged by amount of impervious surface. Roughly 26% of their other funding coming from VDOT road maintenance.

Chesterfield County, Virginia (Community ID #2)

Chesterfield County is located in Riverine, Tidal and Piedmont Physiographical Regions in central Virginia. It has a population of 284,000 that resides in an area of over 440 square miles.

Major Stormwater Program Elements (Table 4):

- Customer Service
- Stormwater Management: Plan Review and Facilities Inspection
- Erosion and Sediment Control
- Floodplain Management
- Dam Safety
- Roadway Drainage
- Inspection Services: Construction, Maintenance and Regulatory
- Capital Improvement Program: Management, Design, and Construction Oversight
- NPDES Phase I
- TMDLs
- Watershed Management: Planning, Water Quality Monitoring, Public Education, Public Involvement
- GIS: Physical Assets

Chesterfield County does not provide GASB 34 Valuation, which is provided by Fairfax County.

Chesterfield County has a stormwater budget of $3,941,000.

Public System Components:

- Ponds
- WQ Structures: Mechanical – Sand Filters
- WQ Structures: Constructed – Wet ponds, wet marshy bottom ponds, dry detention ponds, rain gardens, Filterra Units
- Stream Miles

Private System Components:

- Commercial ponds
- Underground storage units.
- One storm filter

Chesterfield County allows very few BMP types due to high groundwater and aquatic weeds (water mill). They strongly discourage the use of high maintenance BMPs in residential areas. They have a strong emphasis on ponds. Chesterfield follows the Virginia State BMP manual. Residential BMPs are maintained by the County after certification of proper construction. Commercial BMPs are certified after construction and require three year inspection reports that are certified by a professional engineer. If they are not maintained, then the County fixes them and places a lien on the property.

Chesterfield County uses $200,000 from CIP each year; this funding level is “guaranteed” by the County Board in lieu of a stormwater utility. They also spend $200,000 annually on stream restoration.

Chesterfield County utilizes General Funds, Pro Rata Share, Permit Fees, Review Fees, and Other Fees to fund stormwater programs. They place a strong emphasis on cost recovery for plan review and related services. The proposed stormwater utility fee was viewed as a "rain tax" by the public; therefore, the County Board created a "guaranteed CIP fund."

Montgomery County, Maryland (Community ID #3)

Montgomery County is located in the Piedmont Physiographical Region to the north of Washington DC. It has a population of 873,300 that resides in an area of 496 square miles.

Major Stormwater Program Elements (Table 4):

- Customer Service
- Stormwater Management: Plan Review and Facilities Inspection
- Erosion and Sediment Control
- Floodplain Management
- Dam Safety
- Roadway Drainage
- Inspection Services: Construction and Maintenance
- Capital Improvement Program: Management, Design, and Construction Oversight
- NPDES Phase I
- Watershed Management: Planning, Water Quality Monitoring, Public Education, Public Involvement.
- GIS: Physical Assets
- GASB 34 Valuation

Montgomery County does not have TMDLs, which are monitored in Fairfax County.

Montgomery County has a stormwater budget of $3,276,150.

Public System Components:

- 765 Dry Ponds
- 353 Wet ponds
- 353 Filtration Systems
- 616 Infiltration Systems
- 1,033 OW separators
- 294 underground detention structures
- 259 other BMPs

Private System Components:

- Commercial: 255 dry ponds, 92 wet ponds, 140 Filtration Systems, 537 separators, 215 underground detention structures, 77 other
- Residential: 342 dry ponds, 144 wet ponds, 161 filtration, 89 infiltration, 187 separators, 26 underground, 141 other.
- Parks and Planning: 86 dry ponds, 42 wet ponds, 9 filtration, 95 infiltration, 29 separators, 20 underground, 13 other.

- Schools: 26 dry ponds, 4 wet ponds, 16 filtration, 83 infiltration, 129 separators, 29 underground, 9 other.
- Government: 39 dry ponds, 53 wet ponds, 10 filtration devices, 43 infiltration, 123 separators, 7 underground, 12 other.
- Unknown: 17 dry ponds, 18 wet ponds, 17 filtration, 12 infiltration, 28 separators, 5 undergrounds, 7 others.

Montgomery County follows the State of Maryland BMP Design Manual and the Prince Georges County LID manual. The County will not maintain small structures on individual lots unless the County deems on an individual basis that it would be important enough (like a school or other private institution). They do not have standards of performance for privately owned drainage systems. They do have regulations that require maintenance through easements and covenants.

The average age of stormwater facilities is 15-20 years. No other CIP information is recorded.

Montgomery County utilizes a Water Quality Protection Charge to fund stormwater programs. The State enabling legislation allows a system of charges. The charge is based on an ERU of 2,406 square feet (sidewalk, driveway, and rooftop); the initial rate was $12.75 per annum. Associated non-residential properties are based on imperviousness as well as multi-family and condos, and others. Townhomes are based on 1/3 of square feet rate or $4.24. The Charge generates $2.8 million annually, with all of the funds dedicated for stormwater facility maintenance program and street sweeping. While some money goes to maintain stream restoration projects, no money goes to the CIP to actually build projects.

Prince Georges County, Maryland (Community ID #4)

Prince Georges County, Maryland is located in Coastal and Riverine Physiographical Regions to the north of Washington DC. It has a population of 833,100 that resides in an area of over 485 square miles.

Major Stormwater Program Elements (Table 4):

- Stormwater Management: Plan Review
- Erosion and Sedimentation Control
- Floodplain Management
- Inspection Services: Regulatory
- Capital Improvement Program: Management, Design, and Construction Oversight
- Watershed Management: Planning, Water Quality Monitoring, Public Involvement

Prince Georges County does not provide the following elements, all of which are provided by Fairfax County:

- Customer Service
- Stormwater Management: Facilities Inspection
- Dam safety
- Inspection Services: Construction and Maintenance
- NPDES Phase I
- TMDL

- Watershed Management: Public Education
- GIS: Physical Assets
- GASB 34 Valuation

Prince Georges County has a stormwater budget of $26,254,600.

Public System Components:
- 500 ponds

Private System Components:
- Approximately 15,000 ponds

Prince Georges County uses the State of Maryland BMP manual and regulations; this manual only addresses water quality, so the County has its own manuals for LID and flood control.

LID on individual lots is maintained by the individual property owner; the County also holds maintenance agreements, easements, and rights of ways.

The County is spending about $1 million of CIP funds on flooding each year. The estimated cost to remediate all known flood control problems is $160 million. The County prioritizes mostly by flooding potential, frequency, etc. The flood control program was scaled back recently in favor of stream restoration.

Prince Georges County receives funding from several sources, including General Funds, the Stormwater Tax, Pro Rata Share, Permit Fees, Review Fees, and Grants. The largest source is the Stormwater Tax; it is actually a tax and is based on property value. However, it does go into an enterprise fund and can only be used for stormwater. There are two districts that have different rates. The first, which is 90% of the County, is at a rate of $0.135/$100 value. It doesn't matter if the property is residential or commercial. The second district is a strip of more rural area along the Patuxent River, which is taxed at $0.03/$100 value. Most of the latter goes to water quality improvement. The $0.135 rate was set in 1987 and hasn't changed, although it may expand in near future. The $0.03 rate went into affect in 1995 -- there was no tax in this area prior to that. The original taxing district followed the old WSSC boundaries. Another major source of funding comes from cost share grants. The County receives about $2 to $3 million a year for flood control and water quality improvements from State and federal sources. For instance, the County recently received $6 million for LID retrofit from the USEPA. The County is an attractive place for the State and federal government to go because the County usually is able to come up with the cost share. Review fees generate $1 to $2 million per year. There is also a fee in lieu system that generates about $1 million per year. Another very unique feature is that the County has an automated floodplain modeling tool. The County provides floodplain determination services to the development community -- which raises about $250,000 per year. This money is used to pay for GIS staff and computer model updates. The billing system is integrated into the real property tax bill.

Cobb County, Georgia (Community ID #5)

Cobb County is located in the Piedmont Physiographical Region in northern Georgia. It has a population of 607,800 that resides in an area of over 345 square miles.

Major Stormwater Program Elements (Table 4):

- Customer Service
- Stormwater Management: Plan Review and Facilities Inspection
- Erosion and Sedimentation Control
- Floodplain Management
- Dam Safety
- Roadway Drainage
- Inspection Services: Construction, Maintenance and Regulatory
- Capital Improvement Program: Management, Design, and Construction Oversight
- NPDES Phase I
- Watershed Management: Water Quality Monitoring, Public Education
- GIS: Physical Assets
- GASB 34 Valuation

Cobb County does not provide Watershed Management: Planning and Public Involvement, which are provided by Fairfax County

Cobb County has a stormwater budget of $10,700,000.

Public System Components:

- Pipe
- Ponds
- Catch basins/inlets
- WQ Structures: Mechanical and Constructed

Private System Components:

- Catch Basin/inlets

Cobb County uses the Georgia Soil & Water Conservation Commission Field Manual for BMP standards.

CIP funds are only used for floodplain acquisition.

Cobb County has several funding sources. The primary fund is the water/sewer fund. The secondary funds are grants and the General Fund. Cobb County is considering the application of a Stormwater User Fee.

Fulton County, Georgia (Community ID #6)

Fulton County is located in the Piedmont Physiographical Region of north central Georgia. It has a population of 816,000 that resides in an area of over 529 square miles. It is contiguous to Atlanta, the state capital. The area serviced by Fulton County stormwater services does not include several major municipalities including Atlanta, Alpharetta, and College Park. The actual servive population is estimated at 231,300.

Major Stormwater Program Elements (Table 4):

- Customer Service
- Stormwater Management: Plan Review, Facilities Inspection
- Erosion and Sedimentation Control
- Floodplain Management
- Roadway Drainage
- Inspection Services: Construction and Maintenance
- NPDES Phase I
- TMDLs for fecal coliform and sediments.
- Watershed Management: Planning, Water Quality Monitoring, Public Education, Public Involvement.
- GIS: Physical Assets, Natural Resources
- GASB 34 Valuation

Fulton County does not provide Dam Safety, Inspection Services: Regulatory, and Capital Improvement Program: Management, Design, and Construction Oversight, all of which are provided by Fairfax County:

Fulton County has a stormwater budget of $8,600,000

Public System Components:

- Pipe
- A limited number of detention ponds,
- Catch basins/inlets.

Private System Components:

- Does not manage any other private systems.

Fulton County allows the use of wet detention basin and hydrocarbon removal system BMPs. The maintenance standards are currently being developed. They do not have policies in place for the maintenance of small scale BMPs on individual lots. Privately owned drainage systems do not have performance standards, and are inspected only when violations are reported.

Fulton County does not have a CIP program currently in place.

Fulton County uses the General Fund as its primary source of funding stormwater projects. They are currently attempting to create a stormwater utility fee; they anticipate using a bi-monthly billing system using the exiting water bill.

City of Charlotte and Mecklenburg County, North Carolina (Community #7)

The City of Charlotte and Mecklenburg County are located in the Piedmont Physiographical Region of North Carolina, near the center of the state. It has a population of 695,500 that resides in an area of over 526 square miles.

Major Stormwater Program Elements (Table 4):

- Customer Service
- Stormwater Management: Plan Review and Facilities Inspection
- Erosion and Sedimentation Control
- Floodplain Management
- Roadway Drainage
- Inspection Services: Construction, Maintenance and Regulatory
- Capital Improvement Program: Management, Design, and Construction Oversight
- NPDES Phase I
- TMDL
- Watershed Management: Water Quality Monitoring, Public Education, Public Involvement.
- GIS (city only): Physical Assets, Natural Resources
- GASB 34 Valuation (city only)

The City of Charlotte and Mecklenburg County do not provide Dam Safety, which is provided by Fairfax County.

The City of Charlotte and Mecklenburg County have a stormwater budget of $35,000,000.

Public System Components:

- Pipe
- Ponds
- Catch basins/inlets
- WQ Structures (only if they serve a public good)
- 330 FEMA miles, 4000 total miles of perennial and intermittent stream

Private System Components:

- Pipe
- Ponds
- Catch Basin/inlets
- WQ Structures are repaired, but then the owner must maintain the repairs

The City of Charlotte and Mecklenburg County uses BMPs within the water supply watershed for erosion and sediment control. They follow the Town of Huntersville NC LID policy. The County is responsible for maintaining the FEMA designated floodplain. If the County must repair a failed private system, then it will maintain an easement.

The CIP is projected to 2008.

2004:$30.5M	2006:$36M	2008:$37.5M
2005:$34M	2007:$37M	

The City of Charlotte and Mecklenburg County fund stormwater programs through a Stormwater Utility Fee, Permit Fees, Review Fees, Other Fees, and Grants.

- The Stormwater Utility Fee generates roughly $26 million per year.
- A two tiered rate structure is employed ($4.58 for < 2000 square feet, and $5.91 for > 2000 square feet).
- NSFR are billed by ERU (ERU = 2613 square feet).
- The Stormwater Utility Fee is billed monthly and is integrated into the water bill.

City of Nashville and Davidson County, Tennessee (Community ID #8)

The City of Nashville and Davidson County are located in the Piedmont physiographical Region of central Tennessee. It has a population of 570,000 that resides in an area of over 533 square miles.

Major Stormwater Program Elements (Table 4):

- Customer Service
- Stormwater Management: Plan Review and Facilities Inspection
- Erosion and Sedimentation Control
- Floodplain Management
- Roadway Drainage
- Inspection Services: Maintenance
- Capital Improvement Program: Management, Design, and Construction Oversight
- NPDES Phase I community
- TMDL
- Watershed Management: Water Quality Monitoring, Public Education, Public Involvement.
- GIS: Physical Assets and Natural Resources
- GASB 34 Valuation

The City of Nashville and Davidson County do not provide Dam Safety, Inspection Services: Construction and Regulatory, or Watershed Management Planning, all of which are provided by Fairfax County.

The City of Nashville and Davidson County has a stormwater budget of $14,000,000.

Public System Components:

- Closed System Pipes
- Open Channel Culverts
- Catch basins/inlets
- Inlets
- Outfalls

- Detention Ponds
- Open Systems (ditch, man-made channels)
- Stream Miles
- Stormwater Quality BMPs

BMPs are required for all new construction sites with a grading permit (disturbing 10,000 square feet or greater). A BMP guidance manual is provided but no specific BMPs are required. Generally, the developer can pick and choose BMPs at will and they will be approved without scrutiny. The Metropolitan Nashville and Davidson County Stormwater Management Manual Volume 4: Stormwater Best Management Practices (BMP) Manual is used to set BMP standards. Private detention facilities and water quality BMPs have maintenance agreements in place. Performance standards are usually not enforced.

The CIP program includes routine maintenance, remedial maintenance, and capital projects privatized and performed by contractors. It is projected out to three years plus "out years". The CIP has the following projected values:

2005: $5.12M,	2007: $1.37M,
2006: $5.62M	"Out Years": $3.32M

The City of Nashville and Davidson County uses General Funds, Permit Fees, Review Fees and Other Fees to fund stormwater programs.

APPENDIX I-5

The following tables summarize the raw data received from the surveyed communities.

Table 1: Community Key Index

Community	*Multi-Jurisdictional*	Community ID
Virginia Beach, Virginia	N	1
Chesterfield County, Virginia	N	2
Montgomery County, Maryland	Y	3
Prince Georges County, Maryland	Y	4
Cobb County, Georgia	N	5
Fulton County, Georgia	N	6
City of Charlotte and Mecklenburg County, North Carolina	Y	7
City of Nashville and Davidson County, Tennessee	Y	8

Table 2: Basic Community Data

Community ID	Population[2]		Area (mi²)		Annual Precip (in)	Physiographic Region(s)				
	Total	Served by SWP	Total	Served by SWP		Riverine	Tidal	Coastal	Piedmont	Mountain
FFX CO	997,600	997,600	406	378	44.0	X		X		
1	435,000	435,000	312	312	45.1			X		
2	284,000	284,000	440	440	43.5	X	X		X	
3	873,300	826,000	496	483	43.1				X	
4	833,100	782,815	485	469	43.8	X		X		
5	607,800	455,100	345	281	54.0				X	
6	816,000	231,300	529	304	49.0				X	
7	801,000	700,000	526	447	43.1				X	
8	570,000	545,000	533	497	49.5				X	

Community ID	Comments
FFX	Does not include incorporated towns (Herndon, Vienna)
1	Independent City.
2	Unincorporated County.
3	Does not include towns/cities within the County.
4	Does not include towns/cities within the County.
5	Does not include towns/cities within the County.
6	Does not include towns/cities within the County (Atlanta, College Park, East Point, Mountain Park, Alpharetta, Roswell, Fairburn, Union City, and Palmetto).
7	Includes Charlotte and unincorporated areas of Mecklenburg County, NC.
8	Includes the City of Nashville and unincorporated areas of Davidson County, TN.

[2] Population numbers are for 2002, except Fulton County which is 2000.

Table 3: Land Cover (Percentage of Area)

Community ID	Residential		Developed / Non-Residential			Open Space			Other	Total
	Single Family	Multi-Family	Commercial	Industrial	Institutional	Agricultural	Park	Conservation		
FFX	43	8	5	3	10		12		19	100
1	24	16	4	1	21	34			0	100
2	34	1	2	4	7				52	100
3	44	2	2	1		34				83
4	17	3	2	2	14		4	4	47	93
5	55	3	5	2	2		19		6	92
6	29	2	3	3	2	11	1	1	48	100
7	18	29	12	21					20	100
8	34		8	4	2	42			10	100

Community ID	Comment
FFX	Other represents other open space
1	
2	Institutional land uses include large public parks and open space. Other included vacant land and water.
3	
4	Other (47%) includes forested lands. Unaccounted for land area is primarily transportation infrastructures
5	Parks (19%) is a sum of all open space uses. Other is limited access, quarries, TCU, transitional, and other urban and water.
6	Other is a sum of 40.5% forest land, 1.5% golf courses, 3%(limited access, quarries, TCU, transitional, and other urban) & 3% water.
7	Other is a sum of 14% vacant land and 6% other (undetermined use)
8	

Table 4: Major Stormwater Program Elements

Program Area		Community ID								
		FFX CO	1	2	3	4	5	6	7	8
Customer Service		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Stormwater Management	Plan Review	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Facilities Inspection	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Erosion & Sediment Control		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Floodplain Management		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dam Safety		Yes	Yes	Yes	Yes		Yes	No	No	No
Roadway Drainage			Yes	Yes	Yes		Yes	Yes	Yes	Yes
Inspection Services	Construction	Yes		Yes	Yes		Yes	Yes	Yes	
	Maintenance	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
	Regulatory	Yes	Yes	Yes	No Data	Yes	Yes	No	Yes	
Capital Improvement Program	Management	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
	Design	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
	Construction Oversight	Yes		Yes	Yes	Yes	Yes	No	Yes	Yes
Environmental Mandates	NPDES Phase 1	Yes	Yes	Yes	Yes	No Data	Yes	Yes	Yes	Yes
	NPDES Phase 2				No Data		N/A	N/A	Pending	
	TMDL	Yes		Yes			No Data	Yes	Yes	Yes
Watershed Management	Planning	Yes	Yes	Yes	Yes	Yes	No	Yes	No Data	
	Water Quality Monitoring	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Public Education	Yes		Yes	Yes		Yes	Yes	Yes	Yes
	Public Involvement	Yes		Yes	Yes	Yes	No	Yes	Yes	Yes
GIS	Physical Assets	Yes	Yes	Yes	Yes		Yes	Yes	Partial	Yes
	Natural Resources				No Data		No Data	Yes	Partial	Partial
GASB 34 Valuation		Yes		No	Yes		Yes	Ongoing	Partial	Yes

Community ID	Comment
FFX	
1	CIP includes road drainage, master planning, water quality, and dam safety projects.
2	Dam Safety activity only undertaken on water supply reservoir dams; roadway drainage managed with VDOT, but not required by state law.
3	
4	CIP is mostly flood control projects
5	
6	
7	
8	CIP includes work on routine maintenance and remedial maintenance projects.

Table 5: Program Elements in Stormwater Budget

Program Area		Community ID								
		FFX CO	1	2	3	4	5	6	7	8
Customer Service			Yes				Yes	Yes		Yes
Stormwater Management	Plan Review	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Facilities Inspection	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Erosion & Sediment Control		Yes		Yes		Yes	Yes	Yes	Yes	Yes
Floodplain Management		Yes				Yes	Yes	Yes	Yes	Yes
Dam Safety		Yes	Yes							
Roadway Drainage			Yes		Yes		Yes		Yes	Yes
Inspection Services	Construction	Yes		Yes	Yes		Yes	Yes	Yes	
	Maintenance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Regulatory	Yes	Yes	Yes		Yes	Yes		Yes	
Capital Improvement Program	Management	Yes	Yes	Yes		Yes	Yes		Yes	Yes
	Design	Yes	Yes	Yes		Yes	Yes		Yes	Yes
	Construction Oversight			Yes			Yes		Yes	Yes
Environmental Mandates	NPDES Phase 1	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes
	NPDES Phase 2									
	TMDL	Yes						Yes	Yes	Yes
Watershed Management	Planning	Yes	Yes	Yes	Yes	Yes		Yes		
	Water Quality Monitoring	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Public Education	Yes		Yes			Yes	Yes	Yes	Yes
	Public Involvement	Yes			Yes	Yes		Yes	Yes	Yes
GIS	Physical Assets	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
	Natural Resources							Yes		
GASB 34 Valuation		Yes					Yes		Yes	Yes

Table 6: Stormwater Expenses

Community ID	Stormwater [3]Budget	Customer Metrics		Per Capita $	$ / mi²	$ / Mile of Stormwater System
		Population	Area (mi²)			
FFX	$ 11,752,000	997,600	378	$ 11.78	$31,089.95	
1	$ 17,465,800	435,000	312	$ 40.15	$55,980.13	
2	$ 3,941,000	284,000	440	$ 13.88	$8,956.82	
3	$ 3,276,150	826,000	483	$ 3.97[4]	$6,782.92[3]	$4550
4	$ 26,254,600	782,815	469	$ 33.54	$55,979.96	
5	$ 10,700,000	455,100	281	$ 23.51	$38,078.29	$4638
6	$ 8,600,000	231,300	304	$ 37.18	$28,289.47	
7	$ 35,000,000	700,000	447	$ 50.00	$78,299.78	
8	$ 14,000,000	545,000	497	$ 25.69	$28,169.01	$3431

[3] Budget numbers are based fiscal year 2004 spending projections.
[4] Budget and costs shown for #3 are for maintenance activities and watershed planning only and are not included in calculations on average per capita costs used in report.

Table 7: Stormwater Funding Used

Funding Mechanism	Community ID								
	FFX	1	2	3	4	5	6	7	8
General Funds	✓		✓		✓	✓	✓		✓
Water / Sewer Enterprise Fund						✓			
Stormwater User Fee	✪	✓		✓		✪	✪	✓	
Stormwater Tax					✓				
Pro Rata Share	✓		✓		✓				
Permit Fees			✓		✓			✓	✓
Review Fees			✓		✓			✓	✓
Other		✓	✓		✓	✓		✓	✓
Grants	✓				✓	✓		✓	
✓: Active Funding Mechanism ✪: Under consideration									

Community ID	Comments
FFX	
1	26% of funding from VDOT road maintenance
2	Two drainage districts utilize pro-rata funding, including Upper Swift Creek. Pro-rata fee is set at $5010 per impervious acre.
3	Water Quality Fee only funds the County stormwater maintenance program.
4	Dedicated stormwater tax generates $22.5 million of $26.2 million budget for stormwater management
5	
6	
7	Stormwater utility generates roughly $26 million of the jurisdictions' $35 million annually.
8	